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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/510,145 | 04/19/2005 | Mats Sundberg | 1734 | 8647 |
| 20676 | 7590 | 10/03/2006 | EXAMINER | |
| ALFRED J MANGELS 4729 CORNELL ROAD CINCINNATI, OH 452412433 | | | RALIS, STEPHEN J | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 3742 | |

DATE MAILED: 10/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/510,145

Applicant(s)

SUNDBERG ET AL.

Examiner

Stephen J. Ralis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-6 and 8-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-6 and 8-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Applicant is notified of receipt and acknowledgement, on 05 July 2006, of the amendments to Application No. 10/510,145, filed on 03 October 2004.

Joint Inventors – Common Ownership Presumed

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1, 4-6, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schrewelius (U.S. Patent No. 2,955,145) in view of Schrewelius (U.S. Patent No. 2,992,959) and in further view of Sekhar et al. (U.S. Patent No. 5,420,399).

Schrewelius'145 discloses a molybdenum-silicide-type heating element and method of producing (column 2, lines 14-54) containing essentially of molybdenum silicide (column 1, lines 59-42; column 2, lines 1-2, 31-35) and alloys of that material, said method comprising the steps of: producing a material that contains substantially $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$ by mixing a molybdenum aluminum silicide $\text{Mo}(\text{Si}_{1-y}\text{Al}_y)_2$ with SiO_2 (column 2, lines 31-36), and forming a heating element from the produced material (column 2, lines 14-70). While Schrewelius'145 is silent to the production of Al_2O_3 in addition to the $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$, examiner notes that $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$, when combined with SiO_2 and sintered, produces an Al_2O_3 product as will be shown by Schrewelius'959.

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Schrewelius'145 discloses a molybdenum-silicide-type heating element and method of producing except for the product of the mixing comprises Al_2O_3 ; the SiO_2 being at least 98% pure; and the oxide layer not peeling under thermal cycling at about 1500°C.

Schrewelius'959 teaches a method of producing a molybdenum-silicide-type heating element in which a Al_2O_3 product is formed via the chemical reaction to form a ceramic glass component that efficiently stops the grain growth of the silicide at high temperatures (column 5, lines 69-75; column 6, lines 1-7); and the oxide layer not peeling under thermal cycling at about 1500°C (material of type III can withstand a temperature of 1650°C for more than 1000 hours (material III: column 5, lines 11-17; a material able to withstand an operating temperature of 1650°C inherently does not deteriorate or peel over time; column 7, lines 45-50), protecting against further oxidation (column 8, claim 2), thereby increasing the operational life of said heating element.

Sekhar et al. teach a method of producing a heating element utilizing pure SiO_2 to reduce the impurities in the resulting heating element, increasing the working temperature of the heating element (column 16, lines 12-20), thereby producing a more efficient heating element.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the molybdenum-silicide-type heating element and method of producing of Schrewelius'145 with the teaching of the production of Al_2O_3 in addition to the $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$ of Schrewelius'959 to form a ceramic glass component that efficiently stops the grain growth of the silicide at high temperatures, protecting

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against further oxidation (column 8, claim 2), thereby increasing the operational life of said heating element. It would have further been obvious to one of ordinary skill in the art at the time of the invention was made to modify the Schrewelius'145-

Schrewelius'959 molybdenum-silicide-type heating element and method of producing combination with the teaching of utilizing pure SiO_2 of Sekhar et al. to reduce the impurities in the resulting heating element, increasing the working temperature of the heating element, thereby producing a more efficient heating element thereof.

Schrewelius'145 further discloses wherein x lies in the range of 0.4 - 0.6; wherein x lies in the range of 0.45 - 0.55 (i.e. 0.2 - 0.6; column 1, line 69; column 4, claims 1, 3); including the step of partially substituting Re or W in the material $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$ for molybdenum (i.e. W or tungsten; column 1, lines 59-72; column 2, lines 1-2; column 4, claims 1, 3).

6. Claims 2 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schrewelius (U.S. Patent No. 2,955,145) in view of Schrewelius (U.S. Patent No. 2,992,959) and Sekhar et al. (U.S. Patent No. 5,420,399) as applied to claim 1 above, and further in view of Chyung et al. (U.S. Patent No. 3,725,091).

The Schrewelius'145-Schrewelius'959-Sekhar molybdenum-silicide-type heating element and method of producing combination discloses all of the limitations, as described in claim 1 of paragraph 8, except for wherein the SiO_2 is present in the mixture is a silicate and does not affect symmetry of molybdenum silicide crystal lattice; and wherein the silicate is mullite.

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Chyung et al. a method for producing a heating element (column 1, lines 9-14; column 2, lines 10-16) wherein the SiO_2 is present in the mixture (column 3, lines 12-17) is a silicate mullite (i.e. mullite; $3 \text{ Al}_2 \text{ O}_3 \cdot 2 \text{ SiO}_2$ inherently has SiO_2 ; is used; i.e. high temperature applications; column 48-52) and does not affect symmetry of molybdenum silicide crystal lattice (column 2, lines 65-68; column 3, lines 1-7, lines 57-64; column 10-11, claim 9) to provide an improved cermet material of high density, low porosity, good thermal conductivity, low electrical resistivity and good strength which is compatible with both metals and ceramics in terms of thermal expansion and bonding capability, thereby producing a more efficient heating element. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the Schrewelius'145-Schrewelius'959-Sekhar molybdenum-silicide-type heating element and method of producing combination with the mixture and teaching of the use thereof of Chyung et al. to provide an improved cermet material of high density, low porosity, good thermal conductivity, low electrical resistivity and good strength which is compatible with both metals and ceramics in terms of thermal expansion and bonding capability, thereby producing a more efficient heating element.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schrewelius (U.S. Patent No. 2,955,145) in view of Schrewelius (U.S. Patent No. 2,992,959), Sekhar et al. (U.S. Patent No. 5,420,399) and Chyung et al. (U.S. Patent No. 3,725,091) as applied to claim 2 above, and further in view of Sawamura et al. (U.S. Patent No. 5,756,215).

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The Schrewelius'145-Schrewelius'959-Sekhar-Chyung molybdenum-silicide-type heating element and method of producing combination discloses all of the limitations, as described in claim 1 of paragraph 8, except for the silicate being sillimanite instead of mullite. Sawamura teaches that sillimanite is an equivalent structure known in the art (metal oxide comprising at least one of mullite or sillimanite; column 12, lines 40-45). Therefore because these two silicates were art-recognized equivalents at the time of the invention was made, one of ordinary skill in the art would have found it obvious to substitute sillimanite for mullite.

Response to Arguments

8. Examiner accepts amendments to Claims and respectfully withdraws all objections, accordingly.
9. Applicant's arguments filed 05 July 2006 have been fully considered but they are not persuasive.
10. With respect to Applicant's argument that Schrewelius'145 does not disclose $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$, the Examiner respectfully disagrees. Schrewelius'145 discloses $(\text{Mo}_{1-y}\text{M}_y)(\text{Si}_{1-x}\text{Al}_x)_2$ and while the disclosure primarily focuses on the addition of a metal, M, to the composition, Schrewelius'145 explicitly anticipate no metal alloy, M, being present in the composition (the composition becoming $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$; column 1, lines 59-72) and further being combined with SiO_2 (both legs combined with a lower percentage of SiO_2 ; column 2, lines 31-40). Therefore, the Examiner maintains the

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position that Schrewelius'145 anticipates the molybdenum silicide material being $\text{Mo}(\text{Si}_{1-x}\text{Al}_x)_2$ having no metal, M, and combines the composition with SiO_2 .

11. With respect to Applicant's argument Schrewelius'959 does not disclose or even suggest an Al_2O_3 surface layer, but instead only a SiO_2 surface layer, the Examiner respectfully disagrees. While Schrewelius'959 does disclose the layer being a quartz glass or SiO_2 layer, Schrewelius'959 also disclose that during the final sintering process/operation, silica or mixed oxides are formed which fill up the remaining pores and form a surface film of SiO_2 (column 2, lines 28-32; column 4, lines 34-38).

Schrewelius'959 further disclose the ceramic glass component being a product of Al_2O_3 and SiO_2 (column 6, lines 3-7), and with the previous mentioned disclosure, would provide particles Al_2O_3 to fill the pores of SiO_2 . Therefore, the Examiner maintains the position that a SiO_2 with Al_2O_3 in the pores of the surface is an Al_2O_3 layer as well as a SiO_2 .

12. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Ralis whose telephone number is 571-272-6227. The examiner can normally be reached on Monday - Friday, 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robin Evans can be reached on 571-272-4777. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

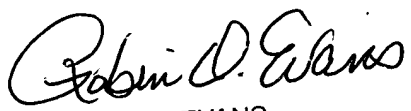
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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Stephen J Ralis
Examiner
Art Unit 3742

SJR
September 15, 2006



ROBIN EVANS
SUPERVISORY PATENT EXAMINER
9/25/06